

System Safety and Reliability Office Procedure

Satellite Orbiting Anomaly Reporting System

1.0 Purpose

This procedure establishes guidelines and methods for capturing on orbit anomaly data for GSFC managed missions and for maintaining the Satellite Orbiting Anomaly Reporting (SOAR) System Database for All NASA missions.

2.0 References

GMI 5310.1b Problem / Failure Anomaly Reporting

3.0 Definitions

a. Anomaly - A departure from normal operation. An abnormality in the mission operations of a spacecraft (in orbit).

b. Criticality - The classification of potential failure modes of the design in relationship to the seriousness of their effects on the system, mission, and personnel. For STS payloads, the catastrophic and safety-catastrophic classifications are:

Criticality	Potential Effect of Failure
“1”	Single failure which could Result in loss of life or vehicle.
“1R”	Redundant hardware item(s), all of which if failed cause loss of life or vehicle.
“1S”	A single failure in a safety or hazard monitoring system that could cause the system to fail to detect combat, or operate when needed during the existence of a hazardous condition and could result in loss of life or vehicle.

c. SOAR Database - The SOAR database is an electronic repository of records of anomalies occurring on GSFC managed space flight missions dating back to about 1980. The database is available on the GSFC Center wide network and will soon be available on the Internet.

4.0 Scope

This procedure covers the responsibilities for the operation of the SOAR Database System, and for publishing the annual report Operational Anomalies in Goddard Spacecraft (OAGS), by the Systems Safety and Reliability Office (SS&RO). This procedure documents only those operations that are under the direct control of the SS&RO. The GMI 5310.1B provides general guidance for activities outside the control of the SS&RO.

5.0 Instructions

5.1 General

The Office of Flight Assurance has been delegated the responsibility to create and maintain a system to capture orbital anomalies on GSFC space flight missions. The SS&RO created the SOAR system to capture and analyze this data. The SS&RO has been capturing and entering the data into a database since the early 1980s and in 1985 began using a computerized relational database to capture and retrieve data. This system is to be used by all GSFC missions to record anomalies per the GMI 5310.1B. The SS&RO has the responsibility to find the data, enter it into the system, and review and analyze it to look for trends and areas for improvement for future missions. The Office also publishes an annual summary of the anomalies in the OAGS. The SS&RO also uses the data to update the failure rate database or reliability database which is used to make predictions on life expectancies.

5.2 Methodology

The Office obtains data from the flight operations teams (FOT) that control the on orbit spacecraft. This is done by meeting with the appropriate FOT leader and getting on a distribution list or getting access to the daily operations logs, depending on how the project and FOT log and maintain their data. The FOT records all aspects of the operations on a daily basis, the SS&RO is interested in only those items that are classified as anomalies. This includes problems with communication, ground tracking, acquisition and data transfer, on orbit hardware / software failures and failures in ground equipment that have an effect on the spacecraft operation. The office uses all data related to the operation of the spacecraft to determine how a spacecraft is or has performed over its lifetime, what hardware failed and when and what caused it.

The FOT provides data on a daily and weekly basis to the SS&RO. The SOAR system engineer receives the data and reviews the data to determine what if any information should be entered into the system. After the review, the engineer provides the screened data to the secretary of the office, who then enters the data into the SOAR system. The SOAR system engineer is also responsible for keeping track of ongoing analyses of anomaly investigations to update the system as anomalies are resolved.

At the end of each calendar year the SS&RO publishes a summary report of the anomalies occurring in the previous year. The SS&RO reliability engineers also update their database on failure histories to provide future reliability calculations and predictions.